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ARE CO-OPERATIVE BANKS AND STOCK BANKS DIFFERENT "CONTRACTS"? EMPIRICAL EVIDENCE USING A COST FUNCTION APPROACH

GILBERTO TURATI

Università degli Studi di Torino

società italiana di economia pubblica

dipartimento di economia pubblica e territoriale – università di Pavia

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1. Introduction[♣]

It is well known that, in a standard Walrasian economy setting, competitive equilibrium exhibits desirable properties from a social standpoint. Apart from the absence of inefficiencies, following from the hypotheses of perfectly competitive and complete markets there are two other consequences almost neglected in the traditional economic analysis. The first one is that the ownership of enterprises (i.e. the class of stakeholders to whom firms' property rights are assigned) is completely irrelevant in terms of economic efficiency (e.g. Drèze, 1976). In other words, in a world of complete contracts like the standard Walrasian framework, whether workers or investors are the firms' owners does not affect the efficiency of the optimal equilibrium allocation. The second consequence, easily derivable from the first one, is that how firms are financed does not impact on economic efficiency (the renowned Modigliani - Miller theorem; see Modigliani and Miller, 1958). The intuition for this last result is that, since workers or investors ownership produces no effects on efficiency, a worker owned firm completely financed with debt is indistinguishable from an efficiency viewpoint from an investor owned firm completely financed with capital.

The striking feature of this economy without imperfections is that, the existence of different "contracts" envisaged by law is difficult to explain in terms of economic efficiency. To put it starkly, suppose that the Walrasian model is a good positive theory; thence whether firms are organised in the form of a joint stock company or a partnership (and whether the joint stock company is investor owned and the partnership worker owned) is totally irrelevant for the efficiency properties of the equilibrium outcome.

However, when one explicitly recognises contracts incompleteness and the existence of different forms of transaction costs, the previous conclusions dramatically change. The result obtained by the theoretical literature (e.g. Hansmann, 1988, 1996; Holmstrom and Milgrom, 1994) is that in a world where transaction costs exist, firms' owners do affect the equilibrium outcome, and ownership is regarded as one mean (among others) to provide incentives to different stakeholders. The common idea underlying these contributions is that the observed pattern of ownership (if we exclude explicit provisions and limitations by law) should be guided by economic principles of efficiency; hence, ownership should be assigned to the class of stakeholders that

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minimises the overall transaction costs involved in the nexus-of-contracts established by the firm. From an empirical point of view, the observed pattern of ownership seems indeed to be linked to the existence of different categories of transaction costs (e.g. Pittatore and Turati, 2000 for the Italian case).

The theoretical proposition implicit in the results provided by Hansmann (1988, 1996) and by Holmstrom and Milgrom (1994) is that different "contracts" (by implying different owners of the firms) are characterised by different levels of transactions costs; hence, the firms are characterised by different levels of economic efficiency. This theoretical proposition can be tested exploiting the literature on frontiers estimation (e.g. Lovell, 1993, for a survey), that provides estimators for production and cost frontiers. After having estimated a common frontier for all the firms operating in a certain industry, one can easily obtain average measures of economic inefficiency characterising each "contract".

Given the availability of the relevant data and the presence of different "contracts", an industry that can be particularly fruitful for this kind of analysis is the banking industry. In Italy, but the situation is similar to other countries as well (see e.g. Altunbas et al., 2001, for the German banking industry), operate in the market at least three different types of organisations: private commercial banks (stock banks), and two co-operative banks, namely the *Banche Popolari* and the *Banche di Credito Cooperativo*. The striking difference among the three groups is the class of stakeholders to whom property rights are assigned; in Italy, these stakeholders are respectively investors, workers and borrowers. But apart from the class of owners, other differences among the three types of "contracts" can be observed for instance in terms of the transaction costs for both depositors and borrowers, of the "lending technology", of the dimensions and branching, and of the costs of ownership.

In this paper, I propose an empirical test of the theoretical prediction that different "contracts" are characterised by different levels of efficiency using data on the Italian banking industry. After briefly reviewing the theoretical literature and considering the transaction costs relevant for the different stakeholders, I estimate a common cost frontier and compare average levels of inefficiency among the three different groups of firms active in the Italian banking market. The main result is that different "contracts" are indeed characterised by different levels of overall inefficiency; hence, the different "contracts" designed by the law seems to be helpful in solving an economic efficiency problem.

The paper is linked to at least two different strands of the literature. As it represents an exercise to empirically assess the validity of the theoretical approach that look at firms as "incentive structures", it falls within the empirical research in transaction costs economics (e.g. Shelanski and Klein, 1995, and Masten, 2002, for a survey). However, differently from the basic empirical model that considers the organisational form as the dependent variable, here I estimate a cost frontier and look at differences in the levels of inefficiency. As it is based on Italian banks data and uses established methodologies to measure efficiency, the paper is also related to research on efficiency in banking (e.g. Altunbas et al., 2001, for a similar exercise using German data).

The remainder of the paper is structured as follows. In section 2 I briefly review the theoretical literature on the modern theory of the firm as an "incentive structure" and develop a theoretical framework useful for the empirical analysis. Section 3 is devoted to the empirical methodology and to a description of the data, while section 4 collects the results. Section 5 summarises the main conclusions.

2. Theoretical background

2.1. A general approach

I work here on the general theoretical approach proposed by Hansmann (1988, 1996) and Holmstrom and Milgrom (1994), that models firms as "incentive structures". Consider J different classes of stakeholders $S = 1, 2, \ldots, J$; each firm in the economy can potentially assume one among J different organisational structures by choosing among the different "contracts" envisaged by the law. An organisational structure is defined as an allocation of the firms' property rights to a specific class j of stakeholders. Since this allocation influences the incentives of the remaining $(J-1)$ classes, it can be said, following Holmstrom (1999), that there are "contractual externalities".
Suppose that class j is the class of stakeholders to which property rights are assigned; then, the social transaction costs SC associated with this particular allocation can be defined as:

$$SC^j = CO_j + \sum_{i \neq j} CC_i^j \qquad (1)$$

where *CO* are the transaction costs associated to stakeholders *j* for being the owners of the firm (the costs of ownership), and *CC* are the transaction costs faced by the remaining stakeholders for their contractual relations with the firm (the costs of contracts).

There are different types of costs of contracts and costs of ownership. Before describing these two categories further, it is worth noting that each type of cost has been separately analysed by two different strands of economic literature, namely the literature on the choice between markets and firms, and the literature on the internal organisation of firms. The former is related to the presence of relationship specific investments in a contract between two parts, and it groups the Transaction Cost Economics approach and the Property Rights approach (see e.g. Williamson, 2000, for a recent comparison of the two approaches). The latter can be referred to the standard principal – agent framework and to the derived literature on the provision of incentives in organisations, and it collects both a positive approach (e.g. Fama, 1980; Fama and Jensen, 1983a, 1983b) and a normative approach (e.g. Grossman and Hart, 1983). Hence, by considering the social transaction costs, Hansmann (1988, 1996) and Holmstrom and Milgrom (1994) put together these two strands of literature, and provide a unitary framework to explain endogenously when it is optimal for a certain class of stakeholders to own a firm in a certain industry.

Here I follow Hansmann's approach, that defines three categories for both the costs of contracts and the costs of ownership. The costs deriving from the existence of ex-ante market power, from the existence of ex-post market power, and from the existence of asymmetric information represent the costs of contracts. The costs of controlling managers (in all the firms where ownership and control are separated), the costs related to collective decision making, and the costs stemming from risk bearing are the costs of ownership. Note that these are all categories of transaction costs well known in the economic literature. For instance, the transaction costs inherent to the existence of ex-ante market power simply resemble the inefficiency related to monopoly, namely higher prices and lower quantities for buyers with respect to the efficient competitive equilibrium. The existence of asymmetric information brings about transaction costs deriving from both adverse selection and moral hazard. The costs of controlling managers are well represented by all the normative solutions designed to solve the standard principal – agent paradigm, and to provide incentives to agents operating inside a firm. The difference with the previous literature is that all these transaction

costs are now considered together in order to define the social transaction costs for all the stakeholders.

2.2. Applying the general framework to the banking industry

When one passes from the general theoretical framework developed by Hansmann to the banking industry, it must be recognised that a unified analysis of the transaction costs related to each class of stakeholders of a bank is lacking.[1] There are, of course, numerous contributions that study the transaction costs (and the possible normative solutions) for depositors and borrowers, probably the two most important class of stakeholders of a bank. Diamond (1984) is a common reference in this case. He shows that, given asymmetric information between lenders and borrowers, a financial intermediary (i.e. an organisation that collects funds from depositors and lends these funds to entrepreneurs) has a cost advantage in monitoring and enforcing a financial contract of debt with respect to direct lending. A financial intermediary enjoys returns to scale in producing monitoring effort, and these cost savings exceed the delegation costs (i.e. the transaction costs bear by depositors who "delegate" the bank to monitor on their behalf the contract with the entrepreneur). An interesting point in Diamond analysis, not sufficiently stressed in the literature, is that there are two different models of financial intermediary: "one model increases the number of agents working together within the intermediary organization as the intermediary monitors a larger number of entrepreneurs. The second model assumes that the intermediary consists of a single agent who monitors a large number of entrepreneurs with independent projects" (see Diamond, 1984, p. 404). Even though Diamond does not recognise this explicitly, it seems possible to relate the first type of intermediary to the model of a co-operative bank, where the agents working together within the organisation are simply the borrowers; Banerjee et al. (1994) refer to this model as an organisational structure characterised by *peer monitoring* among the members of the co-operative. In Hansmann's terminology, this "risk sharing" model of a bank is that of an organisation in which the property rights are assigned to borrowers. On the contrary, the second model of financial intermediary envisaged by Diamond is that of a typical stock bank, an organisation owned by investors.

[1] An exception is represented by Cerasi and Daltung (2000). They extend Diamond (1984) paper by assuming that a banker can monitor effectively only a finite number of investment projects, somewhat considering the internal organisation of the bank. However, the authors do not explore the effects of different allocations of property rights on their monitoring costs.

Assigning ownership to a certain class of stakeholders changes the cost of contracts for the remaining classes. For instance, when depositors are not the owners, they clearly face costs deriving both from the existence of market power and from the existence of asymmetric information in the use of funds. The banking literature has focused mainly on the second category, generally looking for normative solutions. For example, Diamond (1984) proves that when depositors delegate monitoring to a bank, the debt contract is the optimal contractual solution. Rajan (1998), surveying the incomplete contract approach to banking, suggests that fractional reserve banking was a second best solution to protect depositors against the misappropriation of funds from the banker. The introduction of deposit insurance schemes displaced this organisational arrangement, as observed also by Rasmusen (1988), who argues that assigning ownership to depositors is a solution that helps explain the historical evidence on the evolution of banking in the United States.

The role of depositors mirrors the role of investors, since both categories of stakeholders are providers of funds to be invested for the bank. However, differently from depositors that delegate "authority" over their funds, investors can draw on an array of normative solutions (including monitoring) to partially overcome problems of adverse selection and moral hazard. These solutions include the request for collateral, the signalling power of the personal capital of the entrepreneur directly invested in the project, and the borrower's reputation. All these solutions are costly for borrowers.

Turning to borrowers, it is important to distinguish between two broad categories, namely large firms and small firms. These two categories are characterised by a different level of opacity of the relevant information for the banker. In particular, while information on large firms are usually available in the form of financial statements (the so-called "hard" information), information on small firms are not, and must be gathered by the loan officer over the course of the relationship (the so-called "soft" information). This enables the former to collect funds also directly from the market, whilst the latter are highly dependent on internal finance and bank debt as a primary source of external finance (see e.g. Berger and Udell, 2002); hence, small firms bear an higher volume of transaction costs than large firms. These transaction costs are higher also if one think to the other normative solutions that can be used by investors and depositors to mitigate the problems of asymmetric information: small firms do not typically have real assets to be used as collateral, they are characterised by a lower level of capitalisation, and they lack reputation on traditional banking markets. In all these cases, developing a relationship with a bank might represent a possibility for small firms to obtain funds

from a bank. However, Angelini et al. (1998) point out two different theoretical effects stemming from developing such a relationship. On the one hand, there is a virtuous effect on the price and the availability of credit, since more information becomes accessible the longer is the relationship; this contribute to decrease the transaction costs for borrowers. On the other hand, small firms become "informationally captured" and the bank can exploit this rent by worsening contractual conditions; this effect works in the direction of increasing the transaction costs for borrowers.

Beside the costs of contracts, social transaction costs includes the costs of ownership. Also in this case, differences arise between small local banks and banks with a large network of branches, a typical diversity between co-operative banks and stock banks. Of course, the bigger the organisation, the more important the agency problems of controlling managers and workers, and of delegating authority within the organisation. This argument lose some of its power when ownership is assigned to workers, as in a typical *Banca Popolare* in Italy. However, following Hansmann, it is worth noting that if there are substantial differences among workers' tasks (and this is more likely, the larger and more layered is the bank), then the costs of collective decision making could be increased. This is mostly important when banks are organised as co-operatives, due to their particular governing structure (the voting mechanism and the mechanisms for selecting new members, that makes the choice highly discretionary). Finally, as far as the managers are concerned, Rasmusen (1988) recalls that assigning property rights to depositors partially contributes to solve the agency problem, because managers have incentive to pursue a safe investments policy in order to maintain their rents.

The dimension of the bank influences not only the transaction costs arising within the organisation for the agency relationships, but also the ability of the bank to collect, process, and use different kinds of information. In particular, an argument put forward by Berger and Udell (2002) suggests that there is an organisational diseconomy of scale in activities requiring the use of "soft" information. Small banks reduce agency costs in the use of this kind of information with their loan officers by eliminating layers of management; moreover, the president has usually very tight links to the local community, and this further helps mitigating the problems. On the contrary, large banks alleviate the agency costs by reducing the amount of relationship lending, hence reducing delegation of authority within the organisation.

Before turning to the empirical part of the paper, I try now to put together all these suggestions coming from the theoretical literature to find an explanation of when the

co-operative solution (and in particular the borrowers owned co-operative) can constitute an optimal incentive structure. In terms of transaction costs for depositors, the literature suggests that small business lending is the most costly activity for banks, due to the need of collecting "soft" information. The co-operative contract limits these costs by assigning the ownership to both depositors and borrowers, and favouring the peer-monitoring among their members. Given the need to collect "soft" information, the organisation must be locally based: this is guaranteed by the particular governing structure, in particular by the voting mechanism and the process of selecting new members. Hence, from a theoretical point of view, the co-operative contract seem to define an optimal incentive structure for a lending activity based on "soft" information among peers.

3. The empirical analysis

3.1. The methodology

To empirically assess whether the co-operative bank constitutes a different incentive structure with respect to the stock bank, I exploit the literature on frontiers estimation (e.g. Lovell, 1993, for a survey). Since the two "contracts" should be characterised by different levels of efficiency, the basic idea is to estimate a common frontier and compare the average levels of efficiency characterising the types of banks operating in the Italian market.

I assume that banks have access to a common stochastic technology in the production of banking services, represented by the following "extended" production function:

$$\mathbf{y} = f(\mathbf{x}, SC^j, \varepsilon) \tag{2}$$

where **y** and **x** represent respectively the vector of outputs and the vector of inputs; SC^j are the social transaction costs related to the organisation when property rights are assigned to the class of stakeholders *j* (in the terminology of frontiers estimation, this is the term representing inefficiency); ε represents pure random noise that picks up the impact of variables outside the control of the firm (plus potential measurement errors that could plague the data). This approach quite resembles the one by Jensen and Meckling (1979), that argue that "the maximum attainable output of a firm is … *not* purely a matter of "physical" possibilities given the technology and knowledge; the

production function depends on the contracting and property-rights system within which the firm operates".

In the empirical analysis of the banking industry, it is often argued that a common frontier approach is misleading, because it can bring the researchers to confuse technological differences with inefficiency. However, as the theoretical discussion on the firm as an incentive system should have made clear, organisational differences reflect *choice variables* of banking firms. In other words, this means that having access to a common production set, each bank choose the organisational structure and the ownership structure that maximise its objective function. A similar argument is made by Altunbas et al. (2001) that state that "if a priori all firms are faced with the same opportunities to combine labor, physical capital and financial capital to produce outputs that are virtually identical, then the adoption of a technology that results in higher costs or lower profits is the result of a management choice".

Here I model the banking production process described by Eq. (2) following the so-called "intermediation approach" proposed by Sealey and Lindley (1977). I assume that banks use labour (L), physical capital (K), and deposits (D) as inputs in order to produce three outputs: loans (LO) and investments in securities (OEA) (that together define the traditional activity of banks), plus financial services for customers (SER), as part of the innovative activity of commercial banks.

From the production function represented in Eq. (2), it is easy to derive the associated cost function:

$$c = f(\mathbf{y}, \mathbf{w}, SC^j, \varepsilon) \tag{3}$$

where **w** represents the inputs prices vector and the remaining variables are defined as before. Besides the hypothesis of a common production set, concentrating on a common cost frontier requires that the objective function of all the types of banks operating in the industry incorporate total cost minimisation. While this is commonly accepted as true for stock banks, it is sometimes questioned in the literature for co-operative banks. An argument frequently mentioned is that while market forces are expected to discipline managers who run stock banks to minimise costs, the same does not apply to managers of co-operative banks. However, this does not need to be true, and other mechanism (for instance, reputation) can be at work in a co-operative bank to discipline managers, that usually share special connections with the local community. Moreover, as also Altunbas

et al. (2001) note, "competition between banks is likely to emphasise cost minimisation as an important managerial objective".

I specify the cost function in Eq. (3) as a standard translog function. The function to be estimated can then be written as:

$$\begin{gathered}\ln c = \beta_0 + \sum_{i=1}^{3}\beta_i \ln w_i + \sum_{j=1}^{3}\alpha_j \ln y_j + \\ +1/2\sum_{i=1}^{3}\sum_{j=1}^{3}\beta_{ij} \ln w_i \ln w_j +1/2\sum_{i=1}^{3}\sum_{j=1}^{3}\alpha_{ij} \ln y_i \ln y_j + \\ +\sum_{i=1}^{3}\sum_{j=1}^{3}\gamma_{ij} \ln y_i \ln y_j + \eta\end{gathered} \tag{4}$$

where the inputs prices vector is **w** = [w_L, w_K, w_D], the outputs vector is **y** = [LO, OEA, SER], and η is a composed error term that includes both inefficiency (the social transaction costs) and pure random noise. Homogeneity of degree one in prices requires the following restrictions on parameters of the cost function:

$$\sum_{i=1}^{3}\beta_i = 1; \quad \sum_{i=1}^{3}\beta_{ij} = 0, \forall j; \quad \sum_{i=1}^{3}\gamma_{ij} = 0, \forall i \tag{5}$$

whereas equality of cross partial derivatives entails $\alpha_{ij} = \alpha_{ji}$ and $\beta_{ij} = \beta_{ji}$. I impose both set of restrictions on Eq. (4).

From Eq. (4) one can also derive indicators for scale and scope economies. In particular, returns to scale characterising production can be obtained by considering global elasticity of size:

$$\xi = \left(\sum_{i=1}^{3} \frac{\partial \ln c}{\partial \ln y_i} \right) \tag{6}$$

$\xi>1$ ($\xi<1$) implies that the bank is operating under increasing (decreasing) returns to scale, hence the optimal production scale can be obtained by increasing (decreasing) the volume of funds intermediated. Scope economies for output y_i and y_j can instead be written as:

$$\zeta = \frac{\partial^2 \ln c}{\partial \ln y_i \partial \ln y_j} + \left(\frac{\partial \ln c}{\partial \ln y_i} \frac{\partial \ln c}{\partial \ln y_j} \right) \tag{7}$$

Scope economies (diseconomies) exist whenever $\zeta<0$ ($\zeta>0$).

3.2. The data

My empirical analysis is based on a sample of more than 700 Italian banks in 1999. Data are obtained from the *"BilBank 2000 – Analisi dei bilanci bancari"* database managed by the Italian Association of Banks (*Associazione Bancaria Italiana*). It includes banks' balance sheet information on three different types of banks, namely stock banks (*Società per Azioni*, SPA), workers owned co-operatives (*Banche Popolari*, POP), and borrowers owned co-operatives (*Banche di Credito Cooperativo*, BCC). The final sample comprises, in particular, 495 BCC, 39 POP, and 175 SPA.

The three types of banks are characterised by different contracts, and this in turn implies other differences, for instance with respect to the group of stakeholders who own the firm, the dimensions, and the balance sheet structure. As the group of stakeholders who own property rights is concerned, the literature usually recognises that SPA are investors owned firms, POP are workers owned co-operatives, and BCC are borrowers owned co-operatives. These structures are sustained also by the particular governing mechanisms envisaged by the law. In the typical stock bank, every share bear one vote; on the contrary, in the typical co-operative contract, every member bear one vote.

However, an important distinction has to be made between the two types of co-operatives operating in Italy: while BCC maintained their mutual nature, latest regulation on POP strongly mitigated their mutualistic aim. On the one hand, as Presti (1998, my translation) puts it, the Italian Banking Law (*T.U. Bancario*) "absolutely does not prescribe the mutualistic aim for the *Banche Popolari*, and does not stress those rules that are normally used in the general law either to favour it or to compress the lucrative aim". On the other hand, the mutual nature of BCC is emphasised both by the provision that loans must be granted mostly (even if not only) to members (which makes the BCC a contractual arrangement very close to the theoretical model of an organisation characterised by peer monitoring), and by the fact that acceptance of new members is highly discretionary and this contribute to sustain a homogeneous membership (see e.g. Angelini et al., 1998; Presti, 1998).

Other differences between the two types of co-operative banks and the stock banks can be spotted by looking at the data. For instance, BCC are very small compared both to

POP and to SPA, either when considering total assets (table 1a) or when considering the number of employees (table 2a); their small dimensions emphasise their local nature. The balance sheet structure is also different: BCC employ a lower share of total assets in loans and other earning assets with respect to the other two types of banks, probably because of a more prudential administration that, however, is not reflected in the proportion of bad loans (table 1a). A relevant difference concerns the composition of employment in the three organisations: BCC have the highest share of executives and the lowest share of officers; hence, the distance between the two extreme layers of the organisation seems to be reduced in BCC (table 1a). A huge diversity is observed also for profitability as measured by the ROE: the lowest performance is obtained by BCC with 3.27%, whereas POP obtained a 9.94% and SPA a 8.07%. Again, this seems to reinforce the idea that while BCC are still characterised by a mutualistic structure, POP are not.

Estimation of the cost function in Eq. (4) requires the definition of the inputs prices vector $\mathbf{w} = [w_L, w_K, w_D]$ and the outputs vector $\mathbf{y}$ = [LO, OEA, SER]. Price of labour was obtained by dividing personnel expenses by the number of employees; as the structure of employment is different among the three types of banks, I also computed a weighted price of labour by assuming that executives' compensation is three times the basic compensation, and officers' compensation is two times the basic one. Price of physical capital is simply the ratio between administrative expenses and the book value of fixed assets, while price of funds is the ratio between total interest expenses and the volume of funds. Mean values for inputs prices are collected in table 3a: only narrow differences can be observed with respect to inputs prices faced by the three banks; one exception is represented by the higher price of physical capital for POP with respect to both BCC and SPA. As the outputs are concerned, LO and OEA are represented respectively by the total aggregate loans and the total aggregate securities, whereas SER are proxied by the total aggregate securities managed for clients, an off-balance sheet item that is directly related to the flow of services supplied to customers.

4. Results

Estimates of the cost function in Eq. (4) are collected in table 5. Model 1 considers the non-weighted price of labour, whilst model 2 considers the weighted price of labour. Individual cost efficiency scores are derived following the methodology introduced by Jondrow et al. (1982) and are collected in table 4a for the three types of banks. Results

obtained from model 1 are in accordance with those obtained from model 2: the correlation between the two set of efficiency scores is 0.92. BCC and POP, the two types of co-operatives banks operating in the Italian market, are more efficient than SPA. As BCC are independent banks, this result is also reflected by the finding that independent banks are more efficient than banks belonging to a group (table 4b).

However, here I am not interested in the relative ranking of the different types of organisations in terms of efficiency scores, since no clear results are available from the theoretical literature. The main prediction to be tested is that different incentives structures are characterised by different transaction costs, hence by different levels of economic efficiency. I test this prediction by simply checking whether group specific means are statistically different. Indeed, Kruskall-Wallis test indicates that mean efficiency scores are statistically different among SPA, POP and BCC at the 5% level of significance. Thence, different organisations seem to constitute different incentives structures in the banking market.

An interesting point to be made is that these differences probably stem from the ownership structure, and this in turn is linked to the dimension of the bank. From table 4b, one can see that efficiency scores means are statistically different between independent banks and banks belonging to a group, but differences are not statistically significant between head and subsidiary banks. From table 4c, on the contrary, group specific means are statistically different among all classes. Since relationship banking is related to the dimension of the organisation, it would be important to understand whether the higher efficiency stems from the loan technology or is related to other factors; I do not explore this issue further here.

As expected, BCC are found to operate under increasing returns to scale in both models, whereas POP and SPA can exploit only marginal economies of scale; on the contrary, scope (dis)economies are very small for all the three types of banks (table 4a). As can be seen from table 4b, economies of scale are clearly related to the dimension of the bank. By coupling this last result with efficiency scores, one is then left with the conclusion that the efficiency gains from increasing bank's dimension are lower than the efficiency losses stemming from the agency relationships in a more layered organisational structure.

5. Conclusions

In this paper I briefly review the theoretical literature on the firm as an incentive structure. The basic idea is that the ownership of the firm - in the absence of specific provisions by the law that limit the choice - should be assigned to the class of stakeholders that minimises the social transaction costs. These costs are defined as the sum of the transaction costs stemming from a contractual relation for the stakeholders who do not own the firm, and the transaction costs arising within the firm for the class of stakeholders who are the owners. The main prediction of the literature is that different organisations (i.e. firms with different allocations of property rights) are characterised by different levels of social transaction costs, hence by different levels of economic inefficiency.

I propose a test of this prediction focusing on the banking industry. By using data on the Italian markets (where two types of co-operative banks, namely *Banche Popolari* and *Banche di Credito Cooperativo*, co-exist together with stock banks), I estimate a standard translog cost function, with three inputs (labour, physical capital, and deposits) and three outputs (loans, investments in other earning assets, and the flow of services proxied by the volume of securities managed for clients), and I derive cost efficiency scores. Kruskall-Wallis test indicates that mean efficiency scores are statistically different among the three types of banks, providing empirical support to the theoretical prediction that different organisations represent different incentive structures.

Moreover, co-operatives banks appear more efficient than stock banks; hence, the efficiency gains stemming from the presence of scale economies seem to be dominated by the efficiency losses caused by the agency relationships within the bank in a more complex organisation. From a theoretical point of view, a possible explanation is based on the idea that borrowers owned co-operative banks are an optimal incentive structure for a lending activity based on “soft” information. However, whether “relationship banking” is the source of efficiency or other factors are at work is an important point that deserves further scrutiny.

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Table 1a. Descriptive statistics (mean values, 1999)

	All	*BCC*	*POP*	*SPA*
Total assets (bln It. lire)	3850.280	259,284	7787,622	13130,205
Physical capital (% T.A.)	2,4	1,9	1,8	3,7
Loans (% T.A.)	61,8	60	67,7	65,6
Other Earning Assets (% T.A.)	11,2	10,1	14,4	13,5
Deposits (% T.A.)	58,1	57,7	59,7	58,9
Managed securities (% T.A.)	84,8	75,7	86,6	110,6
Bad loans (% loans)	3,8	3,8	3,6	3,6
Nr. Banks	709	495	39	175

Source: our calculations on BilBank data.

Table 1b. Descriptive statistics (mean values, 1999)

	All	***Independent***	***Belonging to a group***	
			Head	*Subsidiary*
Total assets (bln It. lire)	3850.280	404,320	20113,176	12475,66
Physical capital (% T.A.)	2,4	1,9	4,5	3,3
Loans (% T.A.)	61,8	60,7	62,7	67,5
Other Earning Assets (% T.A.)	11,2	10,4	14,5	13,4
Deposits (% T.A.)	58,1	58,1	57,4	58,4
Managed securities (% T.A.)	84,8	79,1	106,3	99,2
Bad loans (% loans)	3,8	3,7	3,3	4,3
Nr. Banks	709	548	56	105

Source: our calculations on BilBank data.

Table 2a. Descriptive statistics: personnel (mean values, 1999)

	All	*BCC*	*POP*	*SPA*
Employees (nr.)	462	42	1065	1487
of which: Executives (%)	*3,1*	*3,7*	*2*	*1,8*
of which: Officers (%)	*10,9*	*9,9*	*11,3*	*13,7*
of which: Other employees (%)	*86,4*	*87,3*	*86,7*	*83,9*
Personnel Expenses (% Operating income)	39,4	40	37,9	38,1
Interm. funds per employee (bln It. lire)	7,915	6,295	7,614	12.430
Nr. Banks	709	495	39	175

Source: our calculations on BilBank data.

Table 2b. Descriptive statistics: personnel (mean values, 1999)

	All	***Independent***	***Belonging to a group***	
			Head	*Subsidiary*
Employees (nr.)	462	67	2348	1472
of which: Executives (%)	*3,1*	*3,6*	*1,9*	*1,5*
of which: Officers (%)	*10,9*	*10,1*	*13,4*	*14*
of which: Other employees (%)	*86,4*	*87,1*	*84,7*	*83,7*
Personnel Expenses (% Operating income)	39,4	39,9	32,5	40,9
Interm. funds per employee (bln It. lire)	7,915	6,378	22,051	8,054
Nr. Banks	709	548	56	105

Source: our calculations on BilBank data.

Table 3a. Descriptive statistics: inputs prices (mean values, 1999)

	All	*BCC*	*POP*	*SPA*
Labour (mln It. lire)	104	103	99	108
Labour weighted (*) (mln It. lire)	89	88	86	91
Physical capital (mln It. lire)	1,132	1,092	1,736	1,112
Funds (%)	3,27	3,35	3,06	3,11
Nr. Banks	709	495	39	175

Source: our calculations on BilBank data. (*) Considering the number of executives, officers and other employees.

Table 3b. Descriptive statistics: inputs prices (mean values, 1999)

	All	***Independent***	***Belonging to a group***	
			Head	*Subsidiary*
Labour (mln It. lire)	104	103	117	104
Labour weighted (*) (mln It. lire)	89	88	98	89
Physical capital (mln It. lire)	1,132	1,144	1,162	1,055
Funds (%)	3,27	3,28	3,51	3,09
Nr. Banks	709	548	56	105

Source: our calculations on BilBank data. (*) Considering the number of executives, officers and other employees.

Table 4a. Profitability, efficiency, scale and scope economies (mean values, 1999)

	All	*BCC*	*POP*	*SPA*
ROE (%)	4,83	3.27 (^)	9.94 (^)	8.07 (^)
Efficiency mod. 1 (*)	83,1	83.7 (^)	84.1 (^)	80.9 (^)
Scale economies mod. 1 (*)	**1,13**	**1.15 (^)**	**1.05 (^)**	**1.08 (^)**
Scope economies (LO-OEA) mod. 1 (*)	**0,02**	**0.01 (^)**	**0.05 (^)**	**0.04 (^)**
Scope economies (LO-SER) mod. 1 (*)	**0,08**	**0.08 (^)**	**0.06 (^)**	**0.07 (^)**
Scope economies (SER-OEA) mod. 1 (*)	**0,003**	**0.002 (^)**	**0.004 (^)**	**0.005 (^)**
Efficiency mod. 2 (**)	78,6	79.7 (^)	79.2 (^)	75.3 (^)
Scale economies mod. 2 (**)	**1,15**	**1.16 (^)**	**1.11 (^)**	**1.11 (^)**
Scope economies (LO-OEA) mod. 2 (*)	**0,008**	**0.003 (^)**	**0.02 (^)**	**0.02 (^)**
Scope economies (LO-SER) mod. 2 (*)	**0,08**	**0.08 (^)**	**0.05 (^)**	**0.07 (^)**
Scope economies (SER-OEA) mod. 2 (*)	**-0,001**	**-0.002 (^)**	0.0001 (^)	-0.0001 (^)
Nr. Banks	709	495	39	175

Source: our calculations on BilBank data. (*) Using non-weighted price of labour.

(**) Using weighted price of labour.

(^) Indicates that group specific means (BCC, POP, SPA) are stat. diff. at the 5% lev. according to Kruskall-Wallis test.

Bold typeface for values indicates significantly different from 1 and 0 (respect. for scale econ. and scope econ.) at the 5% lev. (t-test).

Table 4b. Profitability, efficiency, scale and scope economies (mean values, 1999)

	All	*Independent*	*Belonging to a group*	
			Head	*Subsidiary*
ROE (%)	4,83	3.76 (^) (§)	10.24 (#) (+)	7.31 (#) (+)
Efficiency mod. 1 (*)	83,1	83.7 (^) (§)	82,3	80,6
Scale economies mod. 1 (*)	**1,13**	**1.15 (^) (§)**	**1,05**	**1,06**
Scope economies (LO-OEA) mod. 1 (*)	**0,02**	**0.02 (^) (§)**	**0,04**	**0,04**
Scope economies (LO-SER) mod. 1 (*)	**0,08**	**0.08 (^) (§)**	**0,08**	**0,09**
Scope economies (SER-OEA) mod. 1 (*)	**0,003**	**0.002 (^) (§)**	**0,005**	**0,006**
Efficiency mod. 2 (**)	78,6	79.6 (^) (§)	76,6	74,6
Scale economies mod. 2 (**)	**1,15**	**1.16 (^) (§)**	**1,09**	**1,09**
Scope economies (LO-OEA) mod. 2 (*)	**0,008**	**0.005 (^) (§)**	**0,02**	**0,01**
Scope economies (LO-SER) mod. 2 (*)	**0,08**	**0.08 (^) (§)**	**0,08**	**0,08**
Scope economies (SER-OEA) mod. 2 (*)	**-0,001**	**-0,002**	-0,0006	0,0007
Nr. Banks	709	548	56	105

Source: our calculations on BilBank data. (*) Using non-weighted price of labour.
(**) Using weighted price of labour.
(^) Indicates that group specific means (INDEP., GROUP) are stat. diff. at the 5 % lev. according to Mann-Whitney test.
(§) Indicates that group specific means (INDEP., GROUP) are stat. diff. at the 5 % lev. according to Kolmogorov-Smirnoff test.
(#) Indicates that group specific means (HEAD, SUBS.) are stat. diff. at the 5 % lev. according to Mann-Whitney test.
(+) Indicates that group specific means (HEAD, SUBS.) are stat. diff. at the 5 % lev. according to Kolmogorov-Smirnoff test.
Bold typeface for values indicates significantly different from 1 and 0 (respect. for scale econ. and scope econ.) at the 5% lev. (t-test).

Table 4c. Profitability, efficiency, scale and scope economies (mean values, 1999)

	All	*Total assets (bln It. Lire)*			
		< 104	*> 104 < 258*	*> 258 < 769*	*> 769*
ROE (%)	4,83	-4.76 (^)	7.4 (^)	7.3 (^)	9.4 (^)
Efficiency mod. 1 (*)	83,1	84.1 (^)	84.1 (^)	82.1 (^)	81.9 (^)
Scale economies mod. 1 (*)	**1,13**	**1.18 (^)**	**1.15 (^)**	**1.12 (^)**	**1.05 (^)**
Scope economies (LO-OEA) mod. 1 (*)	**0,02**	**0.01 (^)**	**0.02 (^)**	**0.02 (^)**	**0.04 (^)**
Scope economies (LO-SER) mod. 1 (*)	**0,08**	**0.07 (^)**	**0.08 (^)**	**0.09 (^)**	**0.08 (^)**
Scope economies (SER-OEA) mod. 1 (*)	**0,003**	**0.001 (^)**	**0.002 (^)**	**0.003 (^)**	**0.006 (^)**
Efficiency mod. 2 (**)	78,6	79.6 (^)	80.4 (^)	77.7 (^)	76.7 (^)
Scale economies mod. 2 (**)	**1,15**	**1.17 (^)**	**1.16 (^)**	**1.14 (^)**	**1.1 (^)**
Scope economies (LO-OEA) mod. 2 (*)	**0,008**	**0.007 (^)**	**0.003 (^)**	**0.006 (^)**	**0.01 (^)**
Scope economies (LO-SER) mod. 2 (*)	**0,08**	**0.07 (^)**	**0.08 (^)**	**0.08 (^)**	**0.08 (^)**
Scope economies (SER-OEA) mod. 2 (*)	**-0,001**	**-0.001 (^)**	**-0.002 (^)**	**-0.002 (^)**	0.00003 (^)
Nr. Banks	709	176	179	177	177

Source: our calculations on BilBank data. (*) Using non-weighted price of labour.

(**) Using weighted price of labour.

(^) Indicates that group specific means (BCC, POP, SPA) are stat. diff. at the 5% lev. according to Kruskall-Wallis test.

Bold typeface for values indicates significantly different from 1 and 0 (respect. for scale econ. and scope econ.) at the 5% lev. (t-test).

Table 5. Stochastic frontiers estimates (1999)

	Mod. 1		*Mod. 2*	
	Coeff.	***S.E.***	***Coeff.***	***S.E.***
Constant	-7.44***	(1.09)	-6.69***	(1.43)
LO	1.11***	(0.21)	1.15***	(0.25)
OEA	-0.29**	(0.12)	-0.36***	(0.14)
SER	0.30***	(0.05)	0.22***	(0.08)
WL	1.65***	(0.15)	1.29***	(0.22)
WK	-1.01***	(0.11)	-1.07***	(0.13)
LO*LO	0.04***	(0.01)	0.02	(0.01)
OEA*OEA	0.01**	(0.01)	0.002	(0.006)
SER*SER	0.02***	(0.002)	0.02***	(0.003)
LO*OEA	-0.002	(0.007)	0.005	(0.008)
LO*SER	-0.02***	(0.003)	-0.01***	(0.003)
SER*OEA	-0.002	(0.002)	-0.001	(0.003)
WL*WK	0.0003	(0.01)	0.06***	(0.02)
WL*WD	-0.04	(0.03)	-0.10***	(0.03)
WK*WD	-0.106***	(0.01)	-0.11***	(0.02)
LO*WK	0.03**	(0.01)	0.007	(0.01)
LO*WD	0.07***	(0.02)	0.06**	(0.02)
OEA*WK	0.02**	(0.009)	0.03**	(0.01)
OEA*WD	-0.04***	(0.01)	-0.05***	(0.01)
SER*WK	0.02***	(0.005)	0.01**	(0.007)
SER*WD	0.01***	(0.006)	0.01	(0.009)
Nr. Obs.	709	-	709	-
Lambda (§)	1.17***	(0.107)	1.19***	(0.096)
Sigma-sq. (v)	0,04	-	0.07	-
Sigma-sq. (u)	0,06	-	0.10	-
Log-L	-20,06	-	-205.97	-
Adj. R-squared (#)	0,98	-	0.96	-

Lev. of sign.: (*) 10%, (**) 5%, (***) 1%.
(§) Std. Dev. (ineff.) / Std. Dev. (noise).
(#) R-squared from OLS estimates.